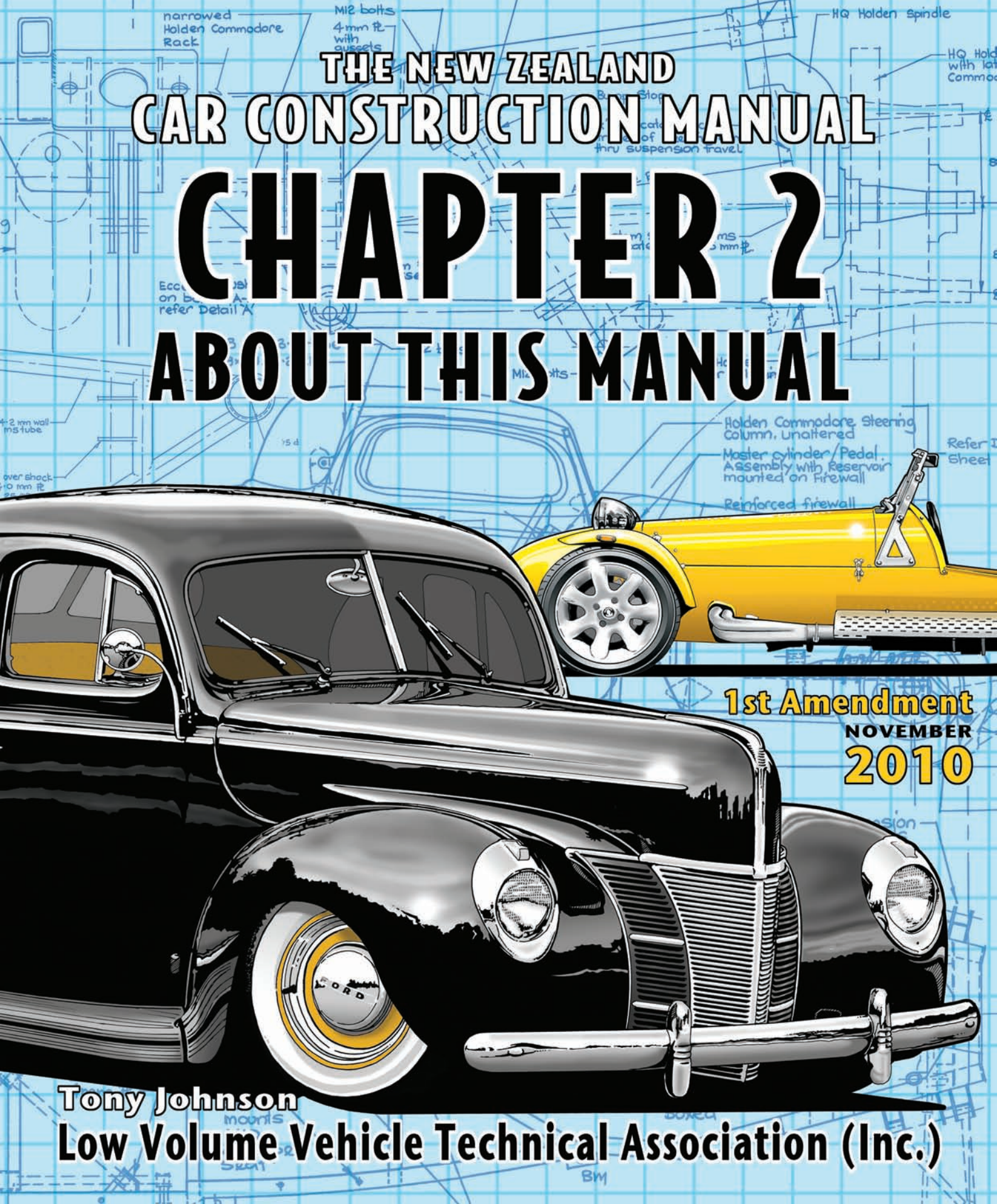
THE NEW ZEALAND

CAR CONSTRUCTION MANUAL

CHAPTER 2

ABOUT THIS MANUAL



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Tony Johnson

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THE NEW ZEALAND
CAR
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Author: Tony Johnson

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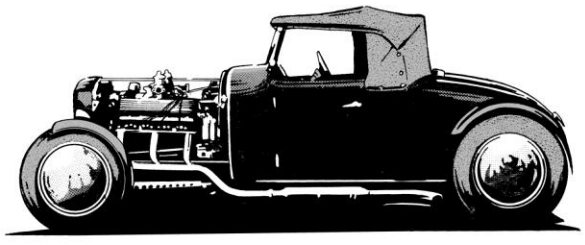

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PUBLISHER & OWNER

The New Zealand Car Construction Manual is published and owned by the Low Volume Vehicle Technical Association Incorporated (LVVTA). LVVTA is an incorporated society and was established in 1992, and represents approximately 50,000 motor vehicle enthusiasts throughout New Zealand.

The New Zealand Car Construction Manual was originally published by the New Zealand Hot Rod Association Incorporated (NZHRA), in January 2007.

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The New Zealand Car Construction Manual was written by Tony Johnson of Auckland New Zealand, for the NZHRA, who originally commissioned the development of the Manual in 2002. Tony has continued to take responsibility for the on-going amendments to the Manual for NZHRA, and for LVVTA since LVVTA took ownership of the Manual in October 2010.

Tony is a self-employed illustrator, journalist, technical writer, and automotive consultant, and is a member of various car clubs and associations.

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NZHRA, and its key personnel, have, and continue to since the inception of LVV certification, form the back-bone of the LVV certification system in New Zealand. LVVTA is very appreciative of NZHRA's on-going commitment and integrity.

DISCLAIMER

The author and publisher have made all reasonable efforts to provide sound and correct advice, based on the historical knowledge and best practice experiences of all parties involved in the development and production of this manual.

However, no responsibility or liability is accepted by the author or the publisher for any error or omission, or any loss suffered by any person relying directly or indirectly on this manual.

Any person who builds or modifies a motor vehicle accepts that there may be some associated risks, and does so in the full knowledge of this, and accepts full responsibility for their own actions.

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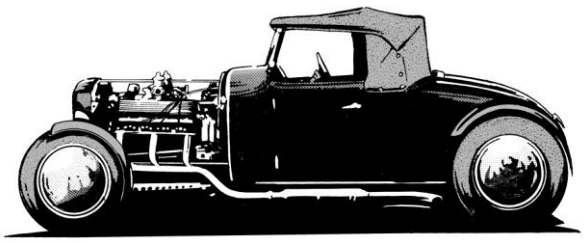

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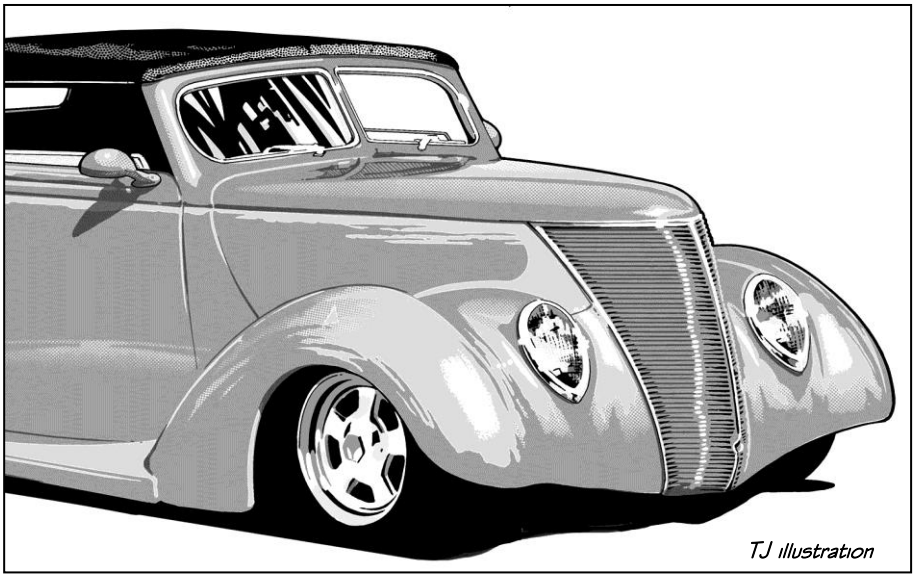
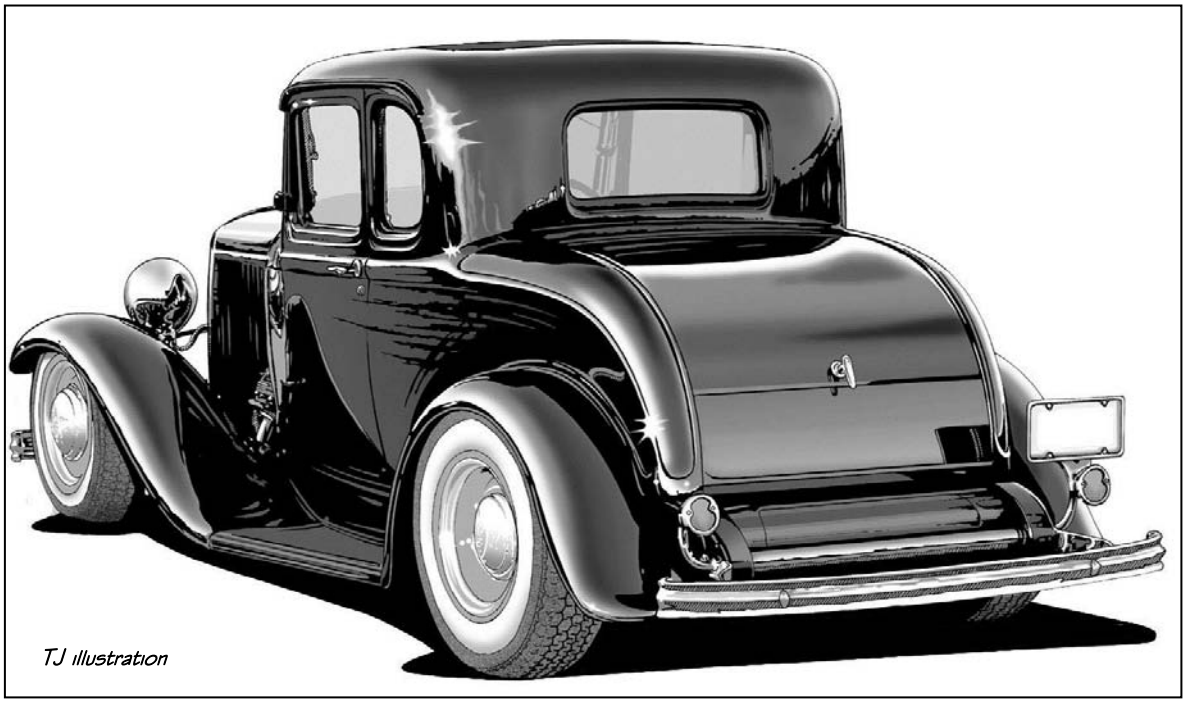
Chapter 2:

ABOUT THIS MANUAL



Chapter 2 Contents



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CHAPTER 2: ABOUT THIS MANUAL

Introduction

There's nothing technical in this chapter – the technical stuff starts at Chapter 5 – but this chapter is still worth a read. This chapter provides some useful bits and pieces of information, aimed at helping you to use this Car Construction Manual, and get through the LVV certification process with the least amount of stress possible.

By reading this chapter, it should help to make the manual look a bit smaller, and make it easier for you to find what you're looking for.

What this manual contains:

2.1 Strong technical focus

Firstly, let's quickly cover what the manual *doesn't* contain. Unlike the old 1992 Code of Construction Manual, there is very little procedural information within this manual. The old Code of Construction had to contain a lot of peripheral information about the LVV systems, procedures, and administrative information, because back then, that book was effectively the whole system.

Since then things have changed considerably. The LVVTA has taken over all of that side of things, and the 8-volume LVV Certification Manual sets out how all of that side of the system works. This information is all well known to your LVV Certifier, and he can guide you through this side of things when you need to know.

This means that the new Car Construction Manual can focus on just that – technical information that will help you to build a car that will eventuate into something that will be well engineered, safe, good to drive and ride in, and be more reliable. The new manual has somewhere in the region of 6 times the quantity of technical information compared to that contained in the old Code of Construction, and the information provided is better detailed, set out more clearly, and will withstand legal scrutiny much better than its predecessor.

The only non-technical information in the manual is 'Chapters 3 – Authority Card' and 'Chapter 4 – Build Approval Process', which have to be specified here, because they are NZHRA systems.

2.2 Philosophy of this manual

This new Car Construction Manual is effectively the sum of three simple ingredients; one - the old 1992 NZHRA Code of Construction Manual; two - the answers to all (or most, anyway) of the hundreds of questions not covered by the Code of Construction Manual that have been raised during the last 18 years; and three – the experiences and knowledge built up and passed back to us by the LVV Certifiers, Technical Advisory Committee members, and hobby car guys building cars since LVV certification began. "Can I use tie-rod ends to secure my radius rods to my chassis?" "Can I drill my old Ford I-beam axle?" "Will I be able to weld up my chassis myself?" "What size tubing should I use for my custom IFS A-arms?"

So, in effect, this manual is not a great big list of things that you can't do, but is in fact a great big list of things that you can do - provided of course certain safety-related requirements are met. "Yes, you can use tie-rod ends to attach your radius rods, provided that..." "Yes, you can drill your I-beam axle, provided that..." "Yes, you can weld up your chassis yourself, provided that..." And so on.

Remember too, that the manual is not set in stone – it will be amended and improved as time goes by, and as new things and better ways of doing things are learnt. A 'living document', as they say. The way that the chapters and page numbering within each chapter have been designed allows for on-going amendments, through individual page or chapter replacements, without messing up the page numbering of the whole manual. Because of the manual's design and format, it is expected to have a very long life.

Tips for using this manual:

2.3 Its not as big as it looks

Don't panic about the size of this manual! Yes, there are a lot of technical requirements in it, but you have to realise that they won't all apply to your car. Your car won't, for example, have a I-beam front axle, and a tube front axle, and a production vehicle independent front suspension, and a custom-built independent front suspension – the manual is designed to cover all of the common different types of components and systems that might apply to your project, but no one vehicle will be using them all.

The first thing you might like to do is to make the manual less daunting, by taking a pencil, and running a pencil line down the middle of each section in each chapter that won't apply to you. You'll then be able to focus on just the parts of the manual that apply to your vehicle, which will have the effect of making the manual suddenly look a whole lot smaller and simpler than when you first looked at it!

2.4 Easy to use format

Hopefully, you'll find the format of the manual easy to follow and use. The 2/3 page sections of Chapter 5-on (the technical stuff) sets out the technical requirements, whereas the 1/3 margin on the right hand side is not requirements, but helpful information. In the 1/3 margin, next to the relevant technical requirements, you'll find helpful comments, explanations, clarifications, interpretations, references, and tips, all of which are designed to enable you to better understand what the relevant technical requirements are getting at.

Don't forget to use the contents pages at the start of each chapter – lots of effort has gone into making it easy for you to find whatever it is that you're looking for. Want to know about how much front-end caster you should be running? That's a steering geometry subject, so go to 'Chapter 7 – Steering Systems'. Then scan down the Chapter 7 contents pages until you find the bold heading 'Steering system geometry requirements'. Then scan down that group of sub-headings until you find 'Caster angle geometry' – there it is - sub-section 7.34, on page 7-27. Easy!

2.5 How to protect the pages

Chances are, this Car Construction Manual is going to spend most of its life in your garage. And chances are that you'll be using it the most when you're up to your elbows in oil. You know what your manual is going to look like by the time you've finished that car!

The best way to protect any document like this is to slip each page into a clear plastic sleeve. Because the manual is ring-bound, doing this is dead easy. There are clear plastic sleeves that you can buy from any stationery shop, designed specifically for this situation – A4 pages in a ring-binder. They come in boxes of 100 (so you'll need 3 boxes), and they cost inside $10 per box. It's a little bit of initial outlay, but they'll keep the pages of your manual clean and legible, and there's the added bonus that your pages will never tear where they go through the rings.

It'll take a bit of time, so that makes it the ideal job for when your kids need a bit of payback.

2.6 Using the key

Within this manual, you will find some different type-faces. Most of the manual is written in a 'normal type', like that which you are reading right now. However, there are a couple of situations where you'll find different text, and it helps to be aware of this.

In other parts of the manual, immediately after a technical requirement, you'll see information provided as normal type in a square shaded box. These are referred to as 'retro-boxes'. Retro-boxes are intended to provide a softening of the technical requirement that they relate to, for in the case of a vehicle that was modified or built before a certain date. This retro-box concept effectively replaces the old 'Retrospective Code of Practice' in the old NZHRA Code of Construction Manual, for pre-1992 vehicles.

In some chapters of the manual, you'll see *'italic type',* which denotes that the information in that *italic type* is lifted from the relevant LVVTA low volume vehicle standard. These excerpts have been made available with permission from the LVVTA, in order to save readers of this manual from having to go elsewhere for more information. Except for very occasional circumstances, everything you'll need to know in relation to building or modifying a car is right here, in this 'one-stop' book.

You'll also see a lot of '*script type*', mostly in the right-hand side 1/3 margins, and in the 'Useful Information' section at the back of each chapter. Anything in *script type* is there just to try and clarify things for you.

Lastly, you'll see the occasional bit of shaded text with a vertical dotted line in the adjacent left-side margin. This shows you the bits that have been amended since the previous version.

To remind readers of these type-face distinctions, a 'key' (in a rectangular box) is provided at the end of the contents section of each chapter, in chapters 3 to 19.

2.7 The illustrations in this manual

The cars illustrated throughout this manual come from all corners of the automotive arena, but they all share a common thread; - they exist because of the ingenuity, creativity, and artistic skills of a rare breed of people who are innately brilliant with their hands, and are massively passionate about unique and special cars.

The hot rods and street machines, which range from resto-rod to radical, in most cases are cars that could still be legally built and driven in New Zealand. In fact most of them were built by Kiwis, who include some of our past and current LVV Certifiers, some past and current TAC members, some past and current NZHRA committee members and Presidents of NZHRA, and an LVVTA Management Committee member. These fantastic New Zealand-built cars each represent a great engineering achievement, and are shown throughout this manual as a small tribute to our clever amateur home-builders and brilliant professional fabricators alike.

Why the race cars? Because there's a kiwi hobby car-building connection with all of them. The drag cars are nearly all New Zealand-built, and if not, they're NZ national championship winners and record-setters. The origins of the circuit cars go back to great New Zealand car-builders like Graham McRae (the Formula 5000 car), and undoubtedly the most successful New Zealand hobby car builder ever – the late great Bruce McLaren. Bruce's race-car building and motor racing career started out no differently to the rest of us; - modifying his road cars in his home garage to find more speed (the Austin Seven special and the Austin Healey), armed with little more than the same intuitive and instinctive engineering and fabrication ability that is shared by many Kiwi hobby car builders. Bruce took that gift and went on to become one of only four men in the world ever to win a Formula One race in a car of his own making.

Things you need to know:

2.8 Before you start building

Before starting down the track of building a hobby car, there are two things that a builder needs to thoroughly consider.

The first thing is to decide whether or not to make use of the design approval process specified in 'Chapter 4 – Build Approval Process'. Although this isn't a mandatory process, it's highly recommended for the novice builder, or a builder that is departing from conventional or traditional ideas, and is building something radically different to the norm.

Even more important than deciding whether or not to make use of the build approval process, any car builder - whether novice or experienced, conventional build methods or radical - needs to form a relationship with the LVV Certifier that he or she will use throughout the vehicle's construction process, at the earliest stage possible.

It's essential to use an LVV Certifier that has had a lifetime of hands-on practical car building experience, and has been an LVV Certifier for a long time. Your best chance of ensuring this is to use an NZHRA-endorsed LVV Certifier, which can be found on the NZHRA website, www.hotrod.org.nz. This will maximise your chances of getting the correct interpretations of the requirements, and an LVV Certifier with the right background and experience will save you time and money, and give you a better riding and driving vehicle at the end.

On a project as expensive and time-consuming as building a car from scratch, you need to make sure that you're in the best hands possible, from the point of view of getting the car safely and legally on the road in the most cost-effective, stress-free manner possible. It could even be more important than selecting the right camshaft or intake manifold!

Make sure you do your homework and establish who your LVV certifier is going to be, and get a relationship going as early as you can – preferably before you buy the steel for the chassis.

2.9 What the LVV certification process might cost

The costs for LVV certification will vary depending on a number of factors. It is up to the LVV Certifier to charge as he sees fit, based on a reasonable hourly rate for his professional services. The greater the extent of the modifications or construction features, and the more problems within a vehicle to identify and advise on, the more time a certifier will have to put in, and the costs will increase accordingly.

Bear in mind that the time the LVV Certifier physically spends inspecting your vehicle, is not the sum total of his input. He has a considerable amount of documentation to create, collate, and prepare, and there are costs that he incurs for having the LVV certification plate manufactured, along with form-sets, courier bags, and phone calls.

He may spend time getting advice or an opinion from LVVTA or another LVV Certifier. He has a lot of non-chargeable time that he has to incur, a portion of which he has to cover within each LVV certification, including becoming and remaining familiar with the LVV Standards, Form-sets, Information Sheets, and other documents within the LVV certification system, and he has to attend LVVTA training sessions at least twice yearly.

He is required to undergo periodic auditing from the New Zealand Transport Agency (at a cost of several hundred dollars a time), and spend time maintaining his New Zealand Transport Agency auditing system. He also has to carry expensive professional indemnity insurance.

Generally speaking, despite all of the costs and work that a LVV certifier is subjected to in order to keep his authority, and the time he spends doing the certification on your vehicle, the LVV certification process (which makes the difference between getting your project on the road or not) will still cost you less than what you paid for that new 650 cfm double-pumper Holley - and as a bonus, your LVV certifier's expertise and experience is likely to help you to end up with a car that is not only safe, but drives well, and is reliable.

Problems and improvements:

2.10 Dispensations to the technical requirements

The Technical Advisory Committee (TAC) has a number of roles. It reviews and comments on concept approval and design approval applications (see 'Chapter 4 – Build Approval Process'), and reviews LVVTA's low volume vehicle standards during their development processes.

In recent years the TAC has been responsible for developing the technical content of this Car Construction Manual, and after the release of the manual, will be responsible for the on-going improvements and additions to it.

The TAC also provides the role of assessing whether or not something that is normally precluded by the technical requirements contained in this manual, can in fact, due to unusual or special circumstances, be used safely. It is accepted that no matter how hard we all try, a set of technical requirements such as those in this manual sometimes won't correctly fit a certain situation. By the very nature of the car-building hobby, we all want to do something that's different in some way to that which everyone else is doing.

Innovation and changes in technology therefore, will sometimes catch the TAC out, and determine that while the manual says a certain thing can't be done or a certain component can't be used, in fact within a certain criteria or set of conditions, it can be safely done or used.

Because of this, the TAC will always provide the role of considering an individual application, on a case-by-case basis, from a builder who wants to do something in a way that is outside of, or precluded by, the requirements in this manual. Where appropriate, the TAC will provide individual approval in writing, to enable that builder to do what it is that he or she wants to do, which in turn will need to be passed onto the LVV Certifier by the builder at the time of LVV certification. If you want to have your unusual situation (that is normally precluded by these technical requirements) considered, address your question in writing to the LVVTA Technical Team at the Wellington LVVTA office (see contact details in 2.12 below), and they will make a representation to the TAC on your behalf at the next TAC meeting, and communicate back to you accordingly.

2.11 Suggestions for improving this manual

It has been stated earlier that this manual has been designed in such a way as to be easily amended, and the intention is that improvements and updates by way of amendment will be an integral part of the life of this manual.

The LVVTA welcomes any comments or ideas that readers might have, and encourage them to feed back any information that might enable the manual to be improved for hobby car builders as time goes by.

Please feel free to forward any comments or suggestions that you might have, in writing, to LVVTA, either to their postal address, or to their e-mail address, both of which are available from their website www.lvvta.org.nz.

2.12 Who to go to for help

If at any time you feel that the technical decisions, or any other aspect of the LVV certification process, has been unfair or unreasonable, you are able to discuss the situation with LVVTA, who you can contact via tech@lvvta.org.nz, or via the contact details on their website www.lvvta.org.nz.